Assignment Four: Probabilistic Reasoning

Due: At the start of lecture, Monday, 4 December 2000.
Total marks: CMPT 417: 40; CMPT 812: 50

If there is any ambiguity in a question, make a sensible choice, and make that choice explicit. Have fun.

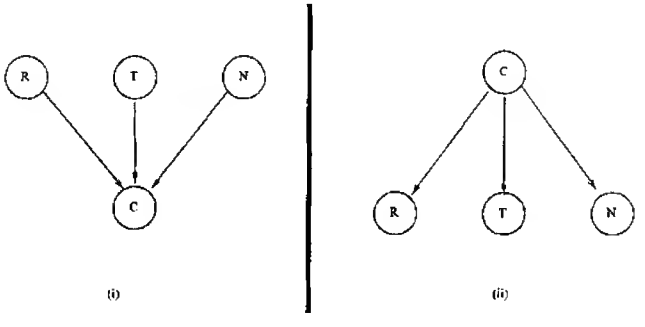
Question 1 (15 marks)

The purpose of this question is to illustrate some knowledge representation issues for Bayesian networks.

You hear on the radio that a cure for a common disease has been found. The evening television news tells the same story, as does the morning newspaper.

Let C represent the truth about the existence of a cure: it exists or does not. Let R represent the claim made on the radio; the radio report may be true or false. Likewise, let T the claim made on the television, and N the claim made in the newspaper.

1. Which of the following Bayesian network topologies best describes the situation, and why?



2. Provide the conditional probability tables for all the random variables in both of the above networks. For each probability, provide an brief verbal explanation of your assessment.

   The following is an example of the format your tables could take. Note that the propabilities and explanation provided in this example are deliberately unreasonable; make more reasonable assessments and explanations in your solution.

C	R	T	N	P(C|R,T,N)	Explanation
exists	true	true	true	0.09	Never trust the media when they agree
exists	true	true	false	0.96	The newspaper is reliably unreliable

3. Suppose that you discover that the media reports were all based on a single published paper in a journal of questionable reliability. Modify the network (the one you determined to be the best) to account for this new information. Provide any new conditional probability tables for your modifications.